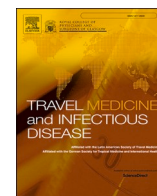




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## Correspondence

# Maximum incubation period for COVID-19 infection: Do we need to rethink the 14-day quarantine policy?

## ARTICLE INFO

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Dear Editor,

Information about the incubation period is crucial for planning containment measures in epidemics. In the case of COVID-19 infection, a maximum incubation period as 14 days has been widely accepted by WHO, national health ministries and other public health actors, and has been recommended as a duration of self-quarantine after the contact with infected person or after the return from epidemic areas. However, since the early February 2020 data have indicated a substantially longer incubation period in some cases. A first study, initially published as preprint, reported the 24-day incubation period in one of 1099 included patients [1], however, the WHO objected that this single case has reflected a double exposure having first contact with infected person 24 days before the symptoms onset and second contact later. As a result, the final article accepted for publication reported the incubation period only as median and interquartile range (IQR) for the whole cohort. However, since then a considerable number of preprints and published articles have identified the maximum incubation period from exposure to illness as 15 [2], 17 [3], 19 [4], and 32 [5] days. Notably, these incubation periods longer than 14 days were registered not only in sporadic cases, but in a substantial proportion reaching 1.5% out of 67 [2], 5.0% out of 339 [6], 7.7% out of 104 [5], and 9.5% out of 136 [3] patients with traced contacts (see Table S1 in the Supplement). A considerable proportion of patients included in these cohorts have not been hospitalized and thus represent more generalizable population during epidemic, in contrast to some reports concerning predominantly hospitalized patients with more aggressive infection. The estimation of the incubation period could be affected by the uncertainty of the exact dates of exposure (recall bias), that was eliminated in one of the aforementioned reports [3] by selectively including patients who temporary stayed only one or two days in the Hubei province or its capital Wuhan during the early epidemic period. Reasons for differences in proportion of patients with longer incubation period between these reports remain unclear, with some data suggesting it could be related to advanced age [3]. To date only basic demographic factors were studied in some reports, but no analysis has been done to identify possible clinical or genetic factors explaining the variance in duration of COVID-19 incubation period.

Primary anonymized patient-level data containing quantitative estimation of the incubation period remain unpublished in open access, with only aggregated information most often available in the form of median and IQR. This makes it impossible to reliably conclude how often the incubation period exceeds the currently recommended 14-day threshold, or which percentage of patients develop symptoms confirmed by a positive SARS-CoV-2 real-time polymerase chain reaction test at any given time after the proven contact with infected person. This uncertainty could be resolved by establishing a primary open data repository which would allow to perform detailed analysis of the incubation period in different subgroups that may be crucial for defining the self-managed quarantine period for travelers coming from abroad. Such analysis would be particularly important given the gradual easing of restrictive measures, reopening borders between regions and the approaching summer vacation period. Availability of these data would inform balanced decisions accounting the interests of public health and economy, and facilitate the engagement of general educated public in the decision making about approval of anti-epidemic measures. An agreement on the maximum incubation period is also important for successful contact tracing that according to the current rules is limited by 14 days.

A possibility to develop COVID-19 symptoms beyond the currently recommended 14-day quarantine in more than 5% of infected persons poses a question whether the epidemic could be halted if mass traveling between regions with different infection rates become active again. Of note, several Chinese territories have accepted a policy of longer quarantine period that seems to account for the aforementioned published data and uncertainty about the maximum incubation period. Thus, recent indications for incoming overseas travelers from the Beijing authorities ([bit.ly/beijing\\_covid](https://bit.ly/beijing_covid)) require to keep 21-day quarantine (performed as a 14-day medical observation in designated facilities followed by an additional 7-day health observation at home), and the mandatory home quarantine period has been increased to 28 and 35 days in several Chinese provinces bordering countries with a high number of persons with confirmed infection ([bit.ly/CaixinCovid](https://bit.ly/CaixinCovid)).

The world urgently needs representative open access data about the maximum incubation period of COVID-19 infection from all trusted

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sources that should be collected and analyzed by an independent international consortium. The consolidated efforts with inclusion of unified extended individual-level data would allow to reveal clinical or genetic factors related to the incubation period, and eventually provide more insights in the SARS-CoV-2 biology. While a vaccine against COVID-19 is still being developed, this would inform global policy regarding duration of quarantine to minimize the risks of further infection spread, and assist to develop sustainable individual and collective preventive measures.

### Author contributions

Boris Bikbov: Conceptualization, Formal analysis, Investigation, Writing - Original draft preparation, Writing - Reviewing and Editing. Alexander Bikbov: Conceptualization, Formal analysis, Writing - Original draft preparation, Writing - Reviewing and Editing.

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### Declaration of competing interest

The authors declare that there are no conflicts of interest.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tmaid.2021.101976>.

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